

Effects of Heat on Celluloid and Similar Materials

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COMBUSTIBILITY

The term "combustibility" may mean either the ease with which combustion is started or the rate at which it proceeds after starting. As is well known, these are entirely different things. The definition of the ignition temperature is uncertain, as in the case of materials which give off combustible gas on heating; the ignition temperature is that of a mixture of the gas with varying amounts of air, rather than of the solid itself. In this respect celluloid resembles wood, but the temperature of decomposition is much lower than that of wood, as is also the ease with which it may be ignited. It is not possible to set fire to a pine board by holding a match to its upper surface, yet we have frequently easily and permanently ignited a heavy plate of celluloid, one-half inch thick, by holding a burning match to its upper surface. It is possible to ignite a plate of sealing wax in the same way, but unlike celluloid the flame does not spread and dies out in a few moments.

If by "combustibility" is meant the rate at which a flame once started is propagated, then it is shown by the results of our experiments that a thin stick of celluloid is five to ten times as combustible as a wooden stick of the same size under the same conditions. We soon reach the limit of size of a wooden stick which can readily be ignited and which will continue to burn if held horizontally, while a larger stick of celluloid will burn easily.

In any sense, therefore, celluloid is much more combustible than wood under similar conditions, and the flame is not as easily extinguished. It is not the celluloid which burns, but the gas evolved from it, just as is the

case with other materials burning with flame. While wood has to be heated either from without or by its own combustion to cause it to give off inflammable gas, celluloid, if in a confined space, generates by itself enough heat to support a decomposition once started, entirely apart from actual combustion. It is therefore impossible to stop the progress of decomposition by shutting off the air, and inflammable gas will continue to be generated. Celluloid has been ignited with no greater initial source of heat than an air bath at 135° C. (275° F.) and has been caused to set fire to cotton and to its own gas, using no source of heat other than a steam coil at 120° C. (248° F.).

It should be distinctly understood that this Bureau is not expressing the opinion that "celluloid" and pyroxylin plastics in general constitute an unusual source of danger in use. It would be no more just to condemn them in this connection than it would be to warn the public against the use of petroleum, of cotton fabrics, and the like. It is, however, right that the very inflammable nature of these materials should be known, as they fill a very important place, and it can only be urged that the same intelligence be used in handling them as is used in handling other highly combustible materials which are to be found in every house or which are worn on the person.

There was found to be no essential difference in composition and behavior between the products of the two American firms whose material was examined or between these and goods of foreign manufacture. Some samples are more stable than others, but this has no connection with the source. We therefore regard the different makes of pyroxylin plastics that were obtainable in 1908, so far as we have examined them, as on the average equally safe, or unsafe, as the case may be.

Tobacco, Fleas and Plague

In an interesting paper under the above title in the February number of the *Indian Medical Gazette*, Mr. S. Mallanah, of Hyderabad, Deccan, reports that tobacco kills fleas practically instantaneously, and his suggestion is that tobacco leaves can be used as a preventive measure which will stamp out plague. He finds that when tobacco leaves are spread over the floors of houses where people sleep the fleas as they enter the rooms perish, with the result that there is no subsequent infection. In his investigations some 52 houses in highly infected areas were "tobaccoed" according to his method. The leaves were stitched on to a piece of matting and laid on the floor. The same number of houses of the same type and in close proximity were left untouched as controls. In spite of the fact that the floor was strewn with tobacco, plague here and there did break out—a fact which the writer attributes to faulty technique, while the number of houses tobaccoed which enjoyed complete immunity was certainly remarkable. Out of 52 houses which were tobaccoed only one house got infected (and that, it is stated, not through the fault of the tobacco), and out of 52 control houses seven got infected, which shows that the tobacco apparently failed in 14.2 per cent of cases and succeeded in preventing plague in 85.8 per cent of the cases under experiment. In conclusion, the writer expresses his firm belief that if the Government spent a fraction—he suggests one-eighth—of what it has actually spent in carrying out his method it would "save the misery and devastation of thousands of homes caused by the appalling death-rate from this calamity." Tobacco, of course, is a well known insecticide, but we are not aware that it has before been reported as being so prompt and effected a pulicide.—*The Lancet*.

The Scientific American Supplement Index for Vol. 85

JANUARY—JUNE 1918

THE * INDICATES THAT THE ARTICLE IS ILLUSTRATED

A	Army Kitchens200	Cave Dwellers of the Missouri Valley100	Corrosion, Boiler305	Electromagnet, A Large55
Abrasive Wheels, Modern202	Artistic Possibilities of Concrete85	Celluloid, A Substitute for208	Crops, The Electroculture of366	Elements, The Complexity of the Chemical78
Absorption and Radiation of the Solar Atmosphere215	Asia, The Gates of226	Cement, Constituents of Portland413	Cruisers of the Italian Fleet215	Electron, Radiation from System of375
Accelerator of Vulcanization, Most Practical219	Atmosphere, Illusions of the and the Traveling Vortex403	Cement, Properties of Portland Having High Magnesia Content347	Crust of the Earth, The165	Employment of Women in Munitions Factories282
Acetylene, Some Reactions of355	Atom, Positive Nucleus of the71	Centrifugal Action, Biological Effects of258	Crystal Growth and Solubility408	Emu in Captivity, The336
Acid Bleaches for Photographic Negatives75	Atomic Weights, Properties of187	Chalk Flints and the Age of the Earth41	Cyanide, New Plant Yielding104	Enclosed Observing Room, The277
Acid Economy in Metal Industries38	Atomic Structure, Problems of290; II, *306; III, *326; IV, *346; V, *358; VI, *378	Cheese Mite, The281		Energy Required to Produce Rain279
Acid-Proof Nickel-Copper-Tungsten-Iron Alloys379	Attraction between Two and Three Bodies224	Chemical Composition and Physiological Action, Relation between267	Dakin or Carrel-Dakin Solution, The196	Engineering Feats of the Ancients347
Acid Resisting Iron288	Aurora of March 7th, The247	Chemical Elements, The Complexity of the78	Dead Sea, Not Dead, The275	Enlarging Lanterns, Reforms in Commercial203
Acid Resisting Metals147	Aurora Borealis, The197	Chemical Industry, Colloids and379	Death Rate, Medicine and the Military105	Engines for British Standard Ships532
Aeronautics, Meteorology and158	Auroral Height, Photographic Determination of217	Chemical Reaction, A403	Decadal Money in England125	Engines, Future Development of128
Aeroplane Engines, German53	Automobiles, Tire Substitutes for403	Chemical Subjects by the Daily Press, Treatment of372	Decolorizing Carbon91	Engines, German Aeroplane53
Aeroplanes, High Flying in Modern368	Automotive in the Great War84	Chest, The Old-Time Treasure228	Deeps of the Pacific, The388	Engines, Marine Steam Turbines and Reciprocating121
Affinity, Problems Bearing on Residual315	Aviation, War284	Chlorine, Origins of the405	Deglet-Khour137	Engines, Motor Fishing Vessels Use Oil87
Africa, The Geology of West350	Asides, Sensitiveness of236	Chlorine, The Ship of the231	Deglet-Nur, The Best Grown in America215	Engines, Una-Flow87
Age and Aera Law, The338		Chlorine, The Ship of the231	Dentist, Responsibility of the387	Engine, The Uniflow48
Age of the Earth, Chalk Flints and the41	Bacterial Treatment of Sewage167	Chlorine, The Ship of the231	Dermatology, The Real157	Erratic Jumps in Clocks, A Possible Explanation of11
Age-Societies of the Plains Indians201	Banana as a Food, The52	Chlorine, The Ship of the231	Desert, The Ship of the231	Ether Ball, The314
Agriculture, Waste Land and151	Battle Telephones376	Chlorine, The Ship of the231	Dissociation of Potatoes in Germany113	Ether, The Relations of Matter and402
Air Compressor, Oil for213	Battlefield, Flora of the Somme8	Chlorine, The Ship of the231	Development of Foreign Oils in Castor Oil230	Eutectoid Steel, Special Properties of176
Airmen Warm, To Keep187	Bee, Odors Emitted by20	Chlorine, The Ship of the231	Development of Alternating Current Work230	Evidence of Matter in Space Obscuring the Passage of Light152
Airplane, Head Resistance of130	Bee, Scent-Producing Organ of the Honey22	Chlorine, The Ship of the231	Development of Films, Plates and Papers, High Temperature187	Evolution of the Human Face, The152
Airplane, Technical History of the187	Beyond the Microscope174	Chlorine, The Ship of the231	Diet and Health, War-Time206	Evolution, The Problem of the Method178; II, 198
Airplane, Types of Military322	Biological Aspects of Warfare I, II, III, 46; III, 5656	Chlorine, The Ship of the231	Direct Selection of Pure Lines118	Exhaust Steam Waste74
Air Pumps and Condensers in Steam Engineering271	Biochemistry of Plants210	Chlorine, The Ship of the231	Disease, The Causes of106; II, 118	Eye Protection and Night Filters9
Alcohol as a Fuel for Internal Combustion Motors271	Biological Effects of Centrifugal Action258	Chlorine, The Ship of the231	Disinfecting Agency, Fumigation as a37	Eyesight, Notes on the Protection of397
Alcohol in Internal Combustion Motors333	Biological Problem, An Important210	Chlorine, The Ship of the231	Disinfecting Rod, The138	
Alcohol, Quantity Obtainable from Various Materials287	Bird Friends, Some Familiar280	Chlorine, The Ship of the231	Drooping, Observations on208	
Alcohol with Various Other Liquid Fuels, Mixtures of330	Birds Used in Falconry223	Chlorine, The Ship of the231	Drying Vegetables A New Conservation Move132	
Alloys, Acid-Proof Nickel-Copper-Tungsten-Iron379	Black Locust Needed for Ships174	Chlorine, The Ship of the231	Dry-Rot in Timber, Controlling25	
Alloys, Rare Metals in the U. S. and395	Boats and Their Origin, Indian73	Chlorine, The Ship of the231	Dufay Versicolor Process in Color Photography, The237	
Alloys and Scrap Metals, Small Castings from171	Bodies, Attraction Between Two and Three225	Chlorine, The Ship of the231		
Alloys to Withstand Internal Air Pressure313	Boiler Corrosion395	Chlorine, The Ship of the231		
Alma-Lorraine, Mineral Wealth of362	Boilers, Increasing the Evaporation of316	Chlorine, The Ship of the231		
Aliscope or Periscope Rifles117	Boots, Utilization of Condensed Army122	Chlorine, The Ship of the231		
Ambrine, Treatment of Severe Burns with190	Brasses and Bronzes, Etching73	Chlorine, The Ship of the231		
American Indian, The Museum of the232	Bread Fruit and Its Possible Uses84	Chlorine, The Ship of the231		
Ammunition in France, Making Cast Ancient Defensive Armor and Modern Warfare180	Breakdown of our Railway Transportation344	Chlorine, The Ship of the231		
Ancient Clock Jacks148	Brewing Materials343	Chlorine, The Ship of the231		
Ancient Flint Implements185	Bricklaying, Science of55	Chlorine, The Ship of the231		
Ancient Saxon Remains407	Bringing Ships from the Great Lakes to the Atlantic Coast40	Chlorine, The Ship of the231		
Animal Camouflage404	Brownies, Movement, Virial Hypothesis and the Theory of the32	Chlorine, The Ship of the231		
Animal Life at the Front414	Burn up Garden Trash67	Chlorine, The Ship of the231		
Anomalies of the Animal World, VI, *4; VII, *48; VIII, *168; IX, *245; X, *308; XI, *373373	Butter, Potato191	Chlorine, The Ship of the231		
Ant, Destroying the Argentine297		Chlorine, The Ship of the231		
Antarctic Reserve, Kerguelen Island as an191	Cadmium for Rustproofing384	Chlorine, The Ship of the231		
Anti-Halo Plates, Denolizing202	Calcium Carbide, Cost of Producing257	Chlorine, The Ship of the231		
Antiseptics202	Camouflage, Animal407	Chlorine, The Ship of the231		
Antiseptics, Research on101	Canal, Mid-Scotland Ship85	Chlorine, The Ship of the231		
Anti-Toxins for War Use, Making104	Candy, Sugars85	Chlorine, The Ship of the231		
Appetites and Aversions as Constituents of Instincts291	Cannel Coal in the United States398	Chlorine, The Ship of the231		
Apple Scald77	Carbonization of Coal, The231	Chlorine, The Ship of the231		
Aquaria in the Home, Salt Water394	Carbon Decolorizing91	Chlorine, The Ship of the231		
Art of Perpetuation, The362	Carving, The Lost Art of Ivory400	Chlorine, The Ship of the231		
Artillery Calculation, Long Range362	Casting from Alloys and Scrap Metals171	Chlorine, The Ship of the231		
Armor, Ancient Defensive and Modern Warfare180	Catalysts, Hydrogen Reactions and384	Chlorine, The Ship of the231		
Army Boots, Utilization of Condensed122	Cat Tail Plant in Industry155	Chlorine, The Ship of the231		
	Cattle, Parasites of Crops and272	Chlorine, The Ship of the231		
	Causes of Disease, The I, 106; II, 118118	Chlorine, The Ship of the231		

29, 1918

400
ed by *236
355
255
ame. 130
*56
*376
Range, *316
27
363
25
*380
29
gen of *12
Tem- *221
Auto- 403
B. 25
*408
ater of 74
non of *136
6
410
7
iron. 64
36
its on 271
139
329
*300
ver of 44
de in 110
110
90
ed by *236
*260
327
y and *356
smis- 110
167
thern 10
220
ines. 121
*292
322
at 37
e of
; II, *310
114
27
19
4
8; II, 25
29
rmi- *12
194
rver *44
*132
tog- *237
87
246
Che. *42
y of 32
361
149
ting 396
ther 396
334
tain 265
267
ceel- 219
*284
54
102
*264
162
*164
206
247
*104
nor *180
18;
III, 58
142
ire 189
274
310
ged 29
405
*248
182
23
239
*120
lis- *276
ad- 32
en 413
386
en 147
m- 282
*36
59
*392
nd 345
w *140
*156
27
117
19
245
A, 67